7. "Furnish Pontcon Q", per each

8. "Furnish Pontoon R", per each

9. "Portcon Ballast", per ton

B. The unit contract prices per each for "Furnish Pontoon A", "Furnish Pontoon B", "Furnish Pontoon C", "Furnish Pontoon D", "Furnish Pcntccn E", "Furnish Pontoon F", "Furnish Pontoon Q" and "Furnish Pontoon R" shall be full compensation for furnishing all labor, materials, tools and equipment necessary and incidental to constructing, launching, towing, mooring, joining the pcntcons and other work as specified in this section.

C. The unit ccntract price per ton for "Pontoon Ballast" shall be full compensation for furnishing all labor, tools, materials and equipment necessary and incidental tc permanently ballast the pcntocns as specified including furnishing and installing the 30 inch corrugated pipe.

CABLE ANCHORS

Part 1 General Requirements

1.01 Description

A. This item consists of furnishing the anchors at the bcttcm of the lake, including turnbuckles, bars, forged links, pins and other parts attached to the anchors. It will also include the excavaticn, placing the anchors in place, inspection of anchors and backfilling.

B. The anchors may be cne of the following as indicated in the plans:

1. Anchcr Type A-J will be used where bottom conditions indicate the anchor can be jetted into the bcttom obtaining ccmplete embedment of the anchor.

2. Anchor Type A-EB will be used where firm bottom material is expected and the water depth is such as to preclude the use of Type B anchors. Placement of Type A-EB anchors will involve excavation of the anchor site as hereinafter specified, placement of the anchor in the excavated site and backfilling the anchor site with gravel and cobbles to completely cover the anchor. The use cf jetting equipment will not be allowed in placing the Type A-EB anchors.

3. Anchor Type B is composed of two steel piles placed in tandem and will be used where firm material and relatively shallow water depths are expected.

1.02 Quality Assurance

A. Anchor Dimensions
Overall reinforced concrete dimension tolerances shall conform to the following requirements.

1. Width and Height: ±2 inch

2. Thickness: + 1/2 inch, -0 inch

3. Reinforcing Steel Cover: -1/8 inch, + 1/4 inch

B. Placing

1. Final placing of the anchor pins, except the south side anchors of pontoons A and R, shall be within a 5 foot 0 inch radius from the locations indicated in the plans. The maximum tolerance for placing the south side anchor pins of pontoons A and R shall be 3 feet 0 inch.

2. Anchors shall be set accurately at the designated locations with their center lines in the same vertical planes as the cables to which they are attached and shall be symmetrical about the line between the anchorpin and the cable saddle.

C. Inspection of Material

1. Pins, Forged Links and Turnbuckles:

a. Inspection shall be in accordance with ASTM A 668, Section 13.

b. Marking shall be in accordance with ASTM A 668, Section 12.

c. Acceptance and rejection shall be in accordance with ASTM A 668, Section 15.

2. Castings

a. Each casting shall be completely subjected to the magnetic particle inspection in accordance with ASTM A 486 Supplementary Requirements Section S2.

b. The standard of acceptability and methods of inspection shall be as listed in Reference Photographs ASTM E 125 and ASTM Methods E 138, Wet Magnetic Particle Inspection.

1. Castings showing injurious defects as judged by ASTM E 125 shall be rejected or repaired with the approval of the Engineer.

D. Each casting shall be marked in accordance with ASTM A 486, Section 11.

1.03 Submittals.

A. Working drawings for the anchors shall be submitted to the Engineer for review.

B. Prior to commencing work on placing of the anchors, the Contractor shall submit to the Engineer for review his plans, procedures and schedules for transporting, lowering, jetting, driving, excavating and placing the anchors.

Part 2 Materials
2.01 Material

A. Gravel And Cobble Backfill

1. Backfill for Type A-EB or Type A-J anchors if required shall be clean gravel and cobbles combined in the following proportions: This mix shall meet the requirements of section 9-03.9(1) of the standard specifications for ballast except for the follcwing special requirements:

The grading and quality requirements are:

%Passing 6 inch square sieve	100
%Passing 3/4 inch square sieve	40-80
%Passing 1/4 inch square sieve	5 max.
%Passing U.S. No. 100 sieve (wet sieving)	0-2
Fracture (each size coarser than U.S. No. 10 sieve)	50% min.

All percentages are by weight.

The sand equivalent value and dust ratio requirements dc not apply.

B. Other Materials:

1. Other materials shall be as shown and noted in the plans and the standard specifications.

Part 3 Construction

3.01 Existing Anchors

A. Reconnection of Existing Anchor.

1. The Contractor shall reconnect anchor cable L-5-N of the existing L.V. Murrow Floating Bridge after Pontoon R is anchored in place.

3.02 Anchor Eyebars

A. While backfilling the anchors with gravel and cobbles, the eyebar of the anchor shall be held as close as possible to the slope of the chord angle between the anchor pin and the cable saddle in the pontcon.

3.03 Type A-J Anchors

A. Location

1. Anchors shall be placed in the locations and at the elevations shown and noted in the plans.

B. Jetting

1. Type A-J Anchors shall be jetted to refusal or until the anchor is completely embedded into the bottom of the lake. For this operation refusal is defined as less than 0.25 foot average penetration of the anchor into the lake bottom in one half hour of jetting at the full capacity of the jetting equipment. Jetting shall be controlled in such a manner that the type A-J anchor will sink, level and uniformly, into the soil and rotating of the anchor will not occur.

2. The pump used for jetting shall be capable of producing a minimum pressure of 400 psi at the pump and deliver a minimum of 1600 gallons per minute for each anchor.

C. Backfilling

1. If any Type A-J anchors fail to sink into the soil a sufficient amount to develop the required resistance to the anchor line pull as verified by the proof loading, the Engineer may require the placing of gravel and cobbles in front of the anchor to increase the capacity of the anchor.

2. Gravel and cobbles in front of the anchor, if required, shall go to firm material and will be paid for at the unit contract price per ton for "Gravel And Cobbles Anchor Type A-EB".

D. Proof Loading

1. The Contractor shall proof load all type A-J Anchors to 100 tons.

2. Procedure for proof loading the anchors shall be as outlined in article 3.07 of this section.

3.04 Type A-EE Anchors

A. Location

1. The Contractor shall place the anchors in the locations and at the elevations shown and noted in the plans.

B. Excavation And Placing

1. At the locations of the Type A-EB anchcrs, the site shall be excavated in such a manner that when the anchor is placed in the excavation, the top of the backwall at the center of the anchor will be at or below the criqinal qround level and no more than 2 feet out of level when measured alonq the 40 foot width of the anchor backwall. If required, a trench shall be excavated alonq the axis of the cable and eyebar to allow the eyebar to assume its normal slope under load.

2. The minimum equipment required for excavatinq Type A-EB Anchors will be a 3 cubic yard clam bucket equipped with a pointed steel qad weighinq a minimum of four tons or equivalent equipment for breakinq up the material to be excavated.

C. Backfillinq

1. The excavated site with the anchor placed in it shall be backfilled to ccmpletely cover the anchors.

D. Proof Ioadinq

1. The Ccntractor shall proof load all type A-EB anchors to 100 tons.

2. Procedure for procf loadinq the anchors shall be as outlined in article 3.07 of this section.

E. Inspecticn

1. After all Type A-EB anchors have been located in their final pcsitions and backfilled, the Contractor shall inspect each anchor and it's excavated pit before and after backfillirq tc make sure that all parts of the anchors are completely located in place and embedded tc the limits specified in section 3.04 B(1) of this spécial provision.

2. The use cf divers, remote control vehicles or other approved methods capable of producinq photcqraphs or TV images cn request are acceptable means of visual inspection.

3.05 Anchor Type B

A. Piles shall be driven plumb and to the embedments shown in the plans.

3.07 Proof Loadinq Anchors

A. All Type A-J and Type A-EB anchors shall be proof loaded to 100 tons. The Contractor shall furnish whatever material, supplies, equipment and labor is necessary to complete the proof loading in accordance with these special provisions and as required by the Engineer.

B. Provided below is the required proof loading procedure for all Type AJ and Type A-EB anchors:

1. The proof loading shall be performed by loading the anchor cable to 100 ton.

2. The rate of applying the load shall not exceed two tons per minute.

3. The movement of each anchor cable at the jacking end shall be recorded to the nearest 1/8 inch at five minute intervals during application of the load.

4. A constant load shall be maintained on the anchor after the total load is applied for a period of 12 hours.

5. If an anchor fails during proof loading, the Contractor shall remedy the situation by a method provided by the Engineer.

6. The load deflection curve obtained from testing two Type A-J anchors shall be available for the Contractor's use upon request and shall be used during the proof loading of the Type A-J and A-EB anchors.

7. Failure is defined as the condition wherein the movement in an anchor exceeds the limits indicated in the load deflection curve.

Part 4 Measurement

4.01 Units of Measurement

A. Measurement of excavation for anchor Type A-EB will be the number of excavations in place.

1. The approximate quantity excavated for this item is estimated to be 12,720 cubic yards. The prospective bidders shall verify this quantity before submitting a bid.

B. Measurement for pontoon anchors will be the number of anchors installed in place.

C. In backfilling Type A-EB anchors, or Type A-J anchors, when required, gravel and cobbles for anchors will be measured by

the ton of material actually placed. The Engineer will determine the respective quantities of gravel and cobbles to be used in backfilling the anchor sites.

D. Approximate quantities per each cable anchor.

1. Anchor Type A-J

a.	Concrete Class AX	42 Cu. Yds.
b.	Steel Reinforcing Bars	10,560 Lbs.
c.	Structural Carbon Steel	4,330 Lbs.
d.	Jetting Pipes	1,326 Lbs.
e.	Forged Steel	103 Lbs.

E. Anchor Type A-EB

a.	Concrete Class AX	42 Cu. Yds.
b.	Steel Reinforcing Bars	10,560 Lbs.
c.	Structural Carbon Steel	4,330 Lbs.
d.	Forged Steel	103 Lbs.
e.	Excavation	1,060 Cu. Yds.

F. Anchor Type B

a.	Structural Carbon Steel	15,600 Lbs.
b.	Cast Steel	1,380 Lbs.
c.	Forged Steel	2,140 Lbs.

Part 5 Payment

5.01 Basis of Payment

A. Payment will be made for such of the following bid items as are included in the proposal, and payment will be made under:

1. "Anchor Type A-J", per each
2. "Anchor Type A-EB", per each
3. "Anchor Type B", per each
4. "Gravel and Cobbles Anchor Type A-EB", per ton

5. "Excavation Anchor Type A-EF", per each. No adjustment will be made in the unit contract price per each even though the actual quantity required for this item may deviate from the one listed under article 3.04, item B of this section.

B. The unit contract prices shall be full compensation for all labor, tools, equipment, incidentals and other work required to complete the work as specified in these special provisions, the plans and the standard specifications.

1. The unit contract price per each for "Anchor Type A-J" shall be full compensation for furnishing all labor, material, tools, proof loading and equipment required for furnishing and installing the anchors in place as shown in the plans and as specified in these special provisions and in the standard specifications. An exception to this will be any additional work and backfilling, if required, during proof loading of the anchor as specified elsewhere in these special provisions. It shall also include all pipe nozzles and fittings and other parts of jetting equipment which are embedded in or permanently attached to the anchors and all costs of providing jetting equipment including pumps, hose, and all necessary fittings in sufficient capacity to operate the jets properly. In addition, it shall also include all materials, equipment, labor and other costs associated with the handling of the existing bridge anchor cables as required to install anchors for the new bridge as specified in these special provisions and as required by the Engineer.

2. The unit contract price per each for "Anchor Type A-EB" shall be full compensation for furnishing all labor, materials, tools, proof loading and equipment required for furnishing and installing the anchors in place as shown in the plans and as specified in these special provisions and in the standard specifications. In addition, it shall also include all materials, equipment, labor and other costs associated with the handling of the existing bridge anchor cables as required to install anchors for the new bridge as specified in these special provisions and as required by the Engineer.

ANCHOR CABLES
Part 1 General
1.01 Description

A. This item of work consists of furnishing and installing the anchor cables including the sockets attached to both ends of the cable in accordance with the plans, the standard specifications and these special provisions.

1.02 Quality Control

A. Sockets

1. Each socket shall be completely subjected to radiographic and magnetic particle inspection in accordance with ASTM A 486, Supplementary Requirements S1 and S2. Radiographs shall be made by X-Ray or gamma ray.

a. The standards of acceptability for radiographic inspection shall be as listed in ASTM Reference Radiographs E 446 and E 186, Level 3 for Categories A, B and C types of discontinuities. Categories D, E, F and G types of discontinuties will not be acceptable.

b. The standards of acceptability for magnetic particle inspection shall be in accordance with ASTM Reference Photographs E 125. Castings showing injurious defects as judged by E 125 shall be rejected or repaired by welding at the approval of the Engineer.

2. Personnel performing radiographic testing shall be qualified in accordance with the American Society for Nondestructive Testing's Recommended Practice No. SNT-TC-1A and its Supplement A Radiographic Testing Method.

3. The castings shall be marked in accordance with ASTM A 486, Section 11.

B. Anchor Cables

1. Tests for the modulus of elasticity shall be made in accordance with section 6.5 of ASTM Designation A 586.

One test sample shall be cut from each manufactured length of strand after the strand, including the test sample, has been prestretched and tested to the minimum breaking strength in accordance with section 8.1 of ASTM Designation A 586. The ends of the test samples shall

be socketed with the same type of strand socket as will be used in the floating structure.

2. Sockets used for the testing shall not be reused in the permanent structure.

1.03 Submittal

A. Test and inspection reports as required shall be submitted to the Engineer for review prior to start of manufacturing process.

B. The Contractor shall submit for Engineer's review, details and calculations of proposed method of socketing with certified test reports showing that the proposed method of connection will develop the ultimate strength of the cable.

1.04 Delivery, Storage And Handling

A. All bridge strands shall be shipped on substantial reels, the minimum diameter of which shall be 25 times the diameter of the strand. No permanent deformation of the wires in the strand shall occur during shipping or handling.

B. The reels will be additionally protected by wrapping the strand with waterproof paper and covering the reels with wooden lagging. Each bridge strand shall be furnished in full length and shipped on a separate reel. No splices or joints other than those permitted in Section 7 of ASTM A 586 will be used in any length of strand.

Part 2 Materials

2.01 Anchor Cable

A. The strands shall be manufactured in accordance with ASTM Designation A 586 and as specified herein.

1. Each strand shall have a minimum guaranteed ultimate strength of 334 tons (or 668,000 pounds) when tested in direct tension.

2. The strand shall be composed of the minimum number of individual wires of maximum diameter consistent with good manufacturing practice.

B. All wires in the outer layer of the strand shall have a Class C weight zinc coating and all inner wire of the strand shall have a Class A zinc coating. The strand shall be prestretched in accordance with section 6.3 of ASTM

Designation A 586 to attain a minimum modulus of elasticity of 23,000,000 pounds per square inch.

C. The new strand shall be thoroughly coated during the stranding operation with Fluid Film A, a liquid corrosion control system manufactured by Eureka Chemical Company, P.O. Box 2205, South San Francisco, CA 94080 or equal. This item of work shall be completed by the cable manufacturer in accordance with the specifications of the fluid film manufacturer. A second surface application of Fluid Film Wire Rope Dressing (WRN-EP), also manufactured by the Eureka Chemical Company, or equal shall be applied by the Contractor as the cable is payed out and submerged to final position. The Wire Rope Dressing shall be applied to the bridge strand by hand or by brushing. The thickness of the gel coating shall not be less than 1/8 inch or greater than 1/4 inch.

D. Wire rope dressing (WRN-EP) shall be manufactured by the Eureka Chemical Company, P.O. Box 2205, South San Francisco, CA 94080 or equal.

2.02 Sockets

A. The sockets shall be steel castings conforming to the requirements of ASTM A 486, Class 90.

B. All patterns to be used in forming the steel castings for the sockets shall become the property of the State. They shall be securely boxed and labeled for storage and delivered to Washington State Department of Transportation, District 1, 10833 Northrup Way N.E., Bellevue, Washington 98004, Attention: Maintenance Engineer.

C. All patterns used in Stage 1 construction and stored by the State are available for the Contractor's use.

2.03 Pins

A. Pins shall be ASTM A 668, Class G.

2.04 Cable Protection at Exit Ports

A. Cable protection at exit ports shall be galvanized, woven, mettalic sleeve or approved equal.

Part 3 Construction Requirements

3.01 Socketing Anchor Cable

A. The anchor cables shall be given an initial tension of at least 20 tons such that the length of anchor line required between the anchor and a prescribed point within the pontoon may be accurately determined. The anchor lines shall then be cut to the required length and the sockets fitted to them.

B. Before the strand is cut, it shall be seized at no less than 5 points each side of the cut. Four of the seizings shall be left in place on the end of the strand until after the socket has been set and allowed to cool. One seizing shall be so placed that it will be just at the end of the socket, and it shall be left in place permanently. Length and spacing of the seizings shall conform with the manufacturer's recommended practice.

C. The Contractor shall attach the sockets to cable ends in accordance with ANSI M11.1

1. Socket filler material shall be zinc, high grade or better, conforming to the requirements of ASTM B 6 or Socketfast, a thermoset resin, manufactured by Philadelphia Resins Corporation or an approved equal.

2. The connection between the anchor cable and the socket shall develop the ultimate strength of the anchor cable.

a. Certified test reports shall be submitted to the Engineer.

D. If the Contractor chooses to specify that one end of the cables be presocketed by the manufacturer, the cable manufacturer may use Ultra Sonic Cleaning methods.

E. The Contractor shall remove the Fluid Film A from the cable using a cloth dampened with a degreasing solvent approved by the Engineer. The cable shall then be painted with two coats of red lead primer, State standard formula A-4-59. The immersion of the cable in the solvent will not be allowed.

F. A second surface application of Fluid Film Wire Rope Dressing (WRN-EP), or equal, shall be applied by the Contractor as the cable is payed out and submerged to final position. The wire rope dressing shall be applied to the bridge strand by hand or by brushing. The thickness of the gel coating shall not be less than 1/8 inch or greater than 1/4 inch.

Wire rope dressing damaged by the Contractor during socketing operations shall be reapplied as directed by the Engineer.

3.02 Installation of Anchor Cable

A. The anchor cables shall be installed to have an axial force which provides a horizontal component force of 120 kips when the lake water is at a normal water level.

1. The force required to overcome the internal jack friction, friction loss in cable saddle, and environmental forces if any during tensioning shall be determined by the Contractor in the field at the time of installation and added to the required axial force to obtain the jacking force.

B. Transverse cables shall be installed by simultaneously jacking the opposite north and south cables of each pontoon while maintaining the structure at the true bridge center line.

1. For pontoons A and B, the Contractor shall jack the transverse west pair of cables or the east pair of cables simultaneously.

C. The Contractor shall anchor the strands fast to the rear strand socket castings inside the pontoons.

1. Adjustments in the length of the anchor cables and adjustment of cable stresses will be made by pulling the rear strand socket casting forward with a hydraulic jack and pull rod working against the front jacking weldment.

2. After pulling forward the amount of the ram travel the rear head shall be anchored in position by means of the bearing plates which shall be bolted to the anchor channels with 1 inch diameter high strength bolts.

3. While adjustments are being made the bearing plates shall be secured by at least six bolts on each side, top and bottom.

4. When the anchor cables are finally secured the full complement of bolts shall be placed therein.

3.03 Inspection of Anchor Cable

A. The Contractor shall inspect each anchor cable anchored in position by a remote control vehicle, diver, or other approved method capable of producing photographs or TV images of anchor cables on request.

1. The inspection shall include the entire exterior surface of the full length of the cable for broken wires, kinks, crushing or other damages, snagging of strand wires and snagging of anchor cables with themselves or other cables. It shall also include connections to links and the connections between the links and the anchors.

2. The use of divers or a remote control vehicle are acceptable means of visual inspection.

3. Inspection shall be done upon completion of installing all anchor cables.

B. The Contractor shall provide a mark line on each anchor cable prior to cutting the cable. Twisting of cables during and after socketing will not be allowed. The mark line will be used during inspection to insure that the cable will remain in the same curvature and location after socketing.

C. The Contractor shall submit certified inspection records and reports prepared by qualified personnel to the Engineer for review.

Part 4 Measurement

4.01 Unit of Measurement

A. Measurement for anchor cable will be the number of linear feet of cable in place measured along the centerline of the cables between sockets.

Part 5 Payment

5.01 Basis of Payment

A. Payment will be made at the unit contract price per linear foot for "Anchor Cable", which price shall be full compensation for all materials, labor, tools and equipment and incidentals necessary to furnish and install the anchor cables as specified herein.

REINFORCED CONCRETE PIERS

This section includes the elevated columns and pier caps on top of pontoons A, B, C, D, Q and R as shown and noted in the plans.

All portions of the reinforced concrete columns that are built within the pontoon peripheries are considered as integral parts of the pontoons. Column reinforcing steel that protrudes from top of pontoon decks is considered as part of the pontoons reinforcing steel.

Reinforcement which extends from top of pontoons shall be protected at all times from damage and, when concrete is placed around the steel, it shall be free from dirt, loose mill scale and rust scale, paint, oil or other foreign substance. If other than inorganic zinc silicate paint is used, it shall be thoroughly removed just prior to pouring concrete around the reinforcing bars. The inorganic zinc silicate paint shall be a solvent system of the self cure type. Water-borne inorganic zinc silicate systems will not be permitted. It shall be approved on the current list of approved inorganic zinc silicate coatings MIL-P-23236 Type 1 Class 3.

All costs involved in painting the reinforcement as specified shall be incidental to and included in the unit contract price per pound for "Steel Reinforcing Bar For Pier".

Concrete shall be concrete Class AX conforming to the requirements of section 6-02 of the standard specifications.

Measurement and payment for the concrete and the steel reinforcing bars that are included in this section shall be in accordance with sections 6-02.4 and 6-02.5 of the standard specifications.

SUPERSTRUCTURE STEEL SPANS

This item of work consists of furnishing material for, fabricating and erecting all structural carbon and low alloy steel, permanent metal forms, sheer studs, anchor bolts, bearings, grout pads, access hatches, bird screening and all other items necessary to construct and complete the superstructure steel spans in accordance with the plans, the standard specifications and these special provisions.

Material
The standard specifications and the applicable ASTM Specifications are supplemented with the following:

1. Main Load-Carrying Tensile Members
Material for members designated in the plans as being main load-carrying tensile members shall meet the longitudinal Charpy V-notch requirements specified in TABLE 1, below. Sampling and testing shall be made in accordance with ASTM Specification A 673.

If the yield strength of material designated to meet ASTM Specification A 572 or A 588 exceeds 65 ksi, the temperature for the Charpy V-notch value for acceptability shall be reduced by 15 degrees F. for each increment of 10 ksi or fraction thereof above 65 ksi. The yield strength shall be the value given in the certified mill test report.

TABLE 1

ASTM Specification Designation	Thickness t (In.)	Absorbed Energy (Ft.-LB.)	Test Temperature (Deg.F.)	Frequency of Testing
A 36	t≤4	15	40	Heat
A 572 & A 588	t≤2	15	40	Heat
A 588	t≤2	15	40	Heat
A 588	2<t≤4	20	40	Heat

Each Charpy V-notch test specimen shall be coded with respect to specimen number. Coding shall provide the capability of identifying both portions of the specimens after testing. The codes shall be recorded on the certified mill test report with the corresponding Charpy V-notch test result.

The broken specimens for each test (three specimens, six halves) shall be packaged and shipped to the Washington State Department of Transportation, Materials Laboratory, P.O. Box 167, Olympia, WA, 98504.

2. Material Traceability
The Contractor shall present in writing and maintain a method of material traceability that is visible at least through the fit-up operation of the main load-carrying tensile members. With the traceability method, the Engineer must be able to verify the material application as it relates to the following:

a. Material specification designation.

b. Heat number.

c. Material test reports for special requirements where required.

3. Edge Finishing
All rolled, sheared and flame-cut edges shall be true to line and free of rough corners and projections. Re-entrant cuts shall be filleted. Corners along exposed edges shall be rounded to at least a 1/16 inch radius.

a. Rolled and Sheared Edges
Rolled and sheared edges of flange components designated in the plans as being main load-carrying tensile members shall have a surface roughness no greater than 250 micro inches as defined by the ANSI Specifications. Other rolled and sheared

edges shall have a surface roughness no greater than 1000 micro inches.

Sheared edges of material more than 5/8 inch in thickness shall be planed back at least 1/8 inch.

b. Flame-Cut Edges
Flame-cut edges of flange components designated in the plans as being main load-carrying tensile members shall have a surface roughness no greater than 250 micro inches as defined by the ANSI Specifications. Other flame-cut edges shall have a surface roughness no greater than 1000 micro inches.

Flame-cutting of material for main load-carrying tensile members shall be controlled to prevent excessive hardening of the edges. The Contractor shall use preheating, postheating or control of the burning process as recommended by the steel manufacturer and approved by the Engineer to control hardening. Edges that have been hardened to a Rockwell Hardness Value of more than C 30 shall be ground or machined to remove the hardened material. The Contractor shall test the flame cut edges and meet the requirements as outlined in APPENDIX A - TESTING ROCKWELL HARDNESS OF FLAME CUT EDGES in these contract documents.

4. Plate Fabrication
Plates for main load-carrying tensile members and main load-carrying tensile member splices shall be fabricated from plate stock so that the primary direction of rolling of the plate stock is oriented parallel to the longitudinal axis of the member.

5. Weldability
If the Contractor elects to use ASTM A 588 Grade D or E steel, he shall provide the Engineer with a proof of weldability prior to fabrication.

Bolted Connections
The eighth and tenth paragraphs of section 6-03.3(6) and the entire text of section 9-06.38 of the standard specifications are deleted and replaced with the following:

1. Bolts, Nuts & Washers
All bolted connections shall be made with nuts, bolts and hardened washers meeting the requirements of ASTM Specification A 325.

2. Bolted Parts
Bolted parts shall fit solidly together when assembled and shall not be separated by washers, gaskets or any other material. When assembled, all joint surfaces, including those adjacent to the bolt heads, nuts and washers, shall be free of oil, paint, lacquer or other coatings, scale, burrs, dirt or other foreign material that would prevent solid seating of parts.

3. Bolt Installation
Each bolt shall be tightened to provide, when all bolts in the joint are tight, at least the proof load (length measurement method) specified in ASTM Specification A 325.

Bolts shall be tightened using one of the methods described in Items 3a. or 3b., below. If required, because of bolt entering and wrench operation clearances, tightening by the selected method may be done by turning the bolt while the nut is prevented from rotating. Impact wrenches, if used, shall have the adequate capacity and a sufficient air supply to perform the required tightening of each bolt in approximately ten seconds.

a. Turn-Of-Nut Tightening
If the turn-of-nut method is used to provide the specified bolt tension, there shall first be enough bolts brought to a snug tight condition to ensure that the parts of the joint are brought into full contact with each other (Snug tight is defined as the tightness attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench.). Following this initial operation, bolts shall be placed in any remaining holes in the connection and brought to snug tightness. All bolts in the joint shall then be tightened additionally by the applicable amount of nut rotation specified in TABLE 2, below, with tightening progressing systematically from the most rigid part of the joint to its free edges. During this operation there shall be no rotation of the part not turned by the wrench.

TABLE 2
Nut Rotation[1] From Snug Tight Condition

Bolt Length (as measured from underside of head to extreme end of point)	Disposition of Outer Faces of Bolted Parts: Both faces normal to bolt axis	One face normal to bolt axis and other face sloped not more than 1:20 (bevel washer not used)	Both faces sloped not more than 1:20 from normal to bolt axis (bevel washer not used)
$l \leq 4D$[2]	1/3 turn	1/2 turn	2/3 turn
$4D < l \leq 8D$	1/2 turn	2/3 turn	5/6 turn
$8D < l \leq 12D$[3]	2/3 turn	5/6 turn	1 turn

[1] Nut rotation is relative to the bolt regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance should be plus or minus 30 degrees. For bolts installed by 2/3 turn and more, the tolerance should be plus or minus 45 degrees.

[2] D = nominal bolt diameter of bolt being tightened.

[3] When the bolt length exceeds 12 D, the required rotation must be determined by actual tests in a suitable tension device simulating the actual conditions.

b. Load-Indicating-Fastener Tightening
The load-indicating-fastener method is permitted provided it can be demonstrated by an accurate direct-measurement procedure that the bolts have been tightened to the specified minimum tensile strength. Tightening shall be by methods and procedures recommended by the manufacturer and approved by the Engineer.

4. Bolt Reuse
Except for galvanized bolts, bolts may be reused if approved by the Engineer, but not more than once. Retightening previously tightened bolts which may have been loosened by the tightening of adjacent bolts shall not be considered as reuse.

Galvanized bolts shall not be reused.

5. Washer Placement
All bolts shall have a hardened washer under the element (nut or bolt head) turned in tightening except that bolts installed by the turn-of-nut method may have the washer omitted.

6. Inspection of Bolt Tightening

a. The Contractor shall install and tighten all bolts. The Engineer will observe the installation and tightening of bolts to determine that the selected tightening method is properly used and that all bolts have been tightened in accordance with Item 3a. or 3b., above.

b. The following inspection procedure shall be used unless a more extensive procedure is specified by the Engineer:

(1) The Contractor, in the presence of the Engineer, shall inspect the bolts using a torque wrench.

(2) Three bolts of the same grade, size (length may be any length representative of bolts used in the structure) and condition as those under inspection shall be placed individually in a calibration device capable of indicating bolt tension. This operation shall be done at least once each working day.

There shall be a washer under the part turned in tightening each bolt if washers are used on the structure. If washers are not used on the structure, the material abutting the part turned shall be of the same specification as that used on the structure.

(3) Each bolt specified in Item 6.b.(2), above, shall be tightened in the calibration device by any convenient means to an initial condition equal to 15 percent of the tension specified in the Item 3., above, and then to 100 percent of the minimum tension specified in Item 3., above. The inspecting wrench shall then be applied to the tightened bolt and the torque necessary to turn the nut or head five degrees (approximately 1 inch at a 12-inch radius) in the tightening direction shall be determined. The average torque measured in the tests of the three bolts shall

be taken as the job inspecting torque to be used in the manner specified in Item 6.b.(4), below.

(4) Bolts, represented by the sample prescribed in Item 6.b.(2), above, which have been tightened in the structure, shall be inspected by applying, in the tightening direction, the inspecting wrench and its job inspecting torque to ten percent of the bolts, but not less than two bolts, selected at random in each connection. If no nut or bolt head is turned by this application of the job inspecting torque, the connection shall be accepted as properly tightened. If any nut or bolt head is turned by the application of the job inspecting torque, this torque shall be applied to all bolts in the connection, and all bolts whose nut or head is turned by the job inspecting torque shall be tightened and reinspected, or alternatively, the Contractor may retighten all of the bolts in the connection and then resubmit the connection for the specified inspection.

Welded Connections

Welding of structural steel, except tack welding for the preliminary attachment of small parts during fabrication, shall be as detailed in the plans. Welding shall commence only after shop plans, as described in section 9-06.27 of the standard specifications, have been submitted and approved. Sections 9-06.54 and 9-06.54(1) of the standard specifications are deleted and replaced by the following:

1. Welding Specifications
Welding and repair welding shall be done in accordance with the AWS Structural Welding Code D1.1-80 and the Third Edition dated 1981 of the AASHTO Standard Specifications for Welding Of Structural Steel Highway Bridges. The listed specifications shall apply in total except for the following items:

   a. Electrogas and electroslag welding techniques are not permitted.

   b. Electrodes for shielded metal-arc welding shall be of the low-hydrogen classification.

   c. Flux for submerged-arc welding shall be dried in ovens at 550 degrees F for at least two hours and stored in ovens held at 250 degrees F or more.

Flux not used within four hours after removal from a drying or storage oven shall be redried before use.

d. Welding is not permitted when the ambient temperature is below 40 degrees F.

e. Minimum preheat and interpass temperatures shall be in accordance with the following:

Thickness (t) of Thickest Part at Point of Welding, (In.)	Temperature (Deg. F.)
t≤3/4	100
3/4<t≤1 1/2	150
1 1/2<t≤2 1/2	200
t>2 1/2	250

f. All web and flange plates, bearing stiffeners, bearing plates and heavy sections that will be restrained when welded, as determined by the Engineer, shall be preheated to at least 250 degrees F.

g. Web to web and flange to flange groove welds, having been rejected on the basis of Item 2., below, may be repaired a maximum of two times. If a third failure occurs, the members shall be trimmed a minimum of 1/2 inch with the approval of the Engineer or replaced at the Contractor's expense before rewelding.

2. Welding Inspection
All welds shall be inspected by certified welding inspectors using the methods described in Items 2.a. through 2.e., below. Inspection techniques and personnel qualification shall be in accordance with the AWS Structural Welding Code D1.1-80 and the Third Edition dated 1981 of the AASHTO Standard Specifications For Welding Of Structural Steel Highway Bridges.

a. Visual Inspection
All welds shall be 100 percent visually inspected.

b. Radiographic Inspection
Tension groove welds, including the tension area of webs (for a minimum distance from the tension flange of 15 inches or 1/3 of the web depth, whichever is greater) designated in the plans, shall be 100 percent inspected using radiographic testing techniques.

c. Magnetic Particle Inspection
Fillet welds for flange to web connections, side plate to cover plate connections (boxed members) and on end and intermediate diaphragms, and groove welds for longitudinal web to web splices shall be inspected using magnetic particle testing techniques.

(1) Flange to Web Connections
Flange to web connection fillet welds shall be 30 percent inspected (10 percent at each end and 10 percent at random lengths along the remainder of the segment) after quality control has been established. A girder segment is defined as the smallest division in a line of girders with respect to girder discontinuity and field splices. The summation of the lengths of all girder segments within a line of girders must equal the total length of that line of girders.

Quality control shall be established on the initial girder segment of the first line of girders inspected. Testing shall proceed continuously along the first welds to be tested (10 percent of the girder segment minimum) until quality control has been established to a level of acceptability as determined by the Engineer.

(2) Side Plate to Cover Plate Connections
Side plate to cover plate connection fillet welds shall be 100 percent inspected.

(3) End and Intermediate Pier Diaphragms
Fillet welds on end and intermediate pier diaphragms shall be 100 percent inspected.

(4) Longitudinal Web to Web Splices
Longitudinal web to web splice groove welds shall be inspected in accordance with Item 2.a.(1), above.

d. Ultrasonic Inspection
Groove welds for transverse flange and web splices and on end and intermediate pier diaphragms shall be inspected using ultrasonic testing techniques.

(1) Transverse Flange and Web Splices
Transverse flange and web splice groove welds shall be 100 percent inspected.

(2) End and Intermediate Pier Diaphragms
Groove welds on end and intermediate pier diaphragms shall be 100 percent inspected.

e. Dye Penetrant Inspection
Groove weld terminations at plate edges shall be 100 percent inspected using dye penetrant or magnetic particle testing techniques.

Fabrication
Sections 9-06.32, 9-06.32(2), 9-06.32(3), 9-06.32(4), 9-06.32(5), 9-06.32(6), 9-06.32(7), 9-06.33, and 9-06.35 of the standard specifications are deleted and replaced with the following:

1. Holes for Bolted Connections

a. Shop Requirements

(1) Bolt Holes - Shop and Field Bolted Connections
All holes, whether for shop or field bolted connections, shall be punched or drilled to full size, or subpunched (subdrilled) and subsequently reamed to full size. A full sized hole is defined as one which is 1/16 inch larger than the nominal diameter of the bolt to be used.

(a) Material forming parts of a member composed of not more than five thicknesses of metal may be punched to full size whenever the thickness of individual parts is not greater than 3/4 inch for structural carbon steel, 5/8 inch for structural low alloy steel or 1/2 inch for structural high strength steel unless subpunching (subdrilling) and subsequent reaming is required by Item 1.a.(2)(a), below.

(b) When there are more than five thicknesses of material composing a member or when any individual part is thicker than 3/4 inch for structural carbon steel, 5/8 inch for structural low alloy steel or 1/2 inch for structural high strength steel, the holes shall be either

subdrilled and subsequently reamed to full size or drilled to full size.

(2) Bolt Holes - Field Bolted Connections

(a) Main Members
Holes for the field connections of continuous beams, bents, towers (each face), plate and box girders and rigid frames, and for the main members of trusses and arches shall be subpunched (subdrilled and subsequently reamed to full size or drilled to full size if required to by Item 1.a.(1)(b), above) and subsequently reamed to full size while assembled.

(b) Secondary Members
Holes for the field connections of all secondary members (crossframes, laterals, diagonals and other bracing members) shall be made in accordance with Item 1.a.(1)(a) or 1.a.(1)(b), above.

(c) Floorbeam and Stringer Ends
Holes for floor beam and stringer end connections shall be subpunched and subsequently reamed to full size using a template or subpunched and subsequently reamed to full size while assembled. Templates shall be as specified in Item b.(4), below.

b. Shop Procedures

(1) Punched Holes
The diameter of the die shall not exceed the diameter of the punch by more than 1/16 inch. If any holes must be enlarged to admit bolts, they shall be reamed. Holes must be clean cut without torn or ragged edges. Poor matching of holes is cause for rejection.

(2) Drilled (Reamed) Holes
Drilled (reamed) holes shall be cylindrical and perpendicular to the member. Members requiring drilled (reamed) holes shall be assembled and securely held together while the holes are being fabricated and shall be match marked before being disassembled.

Where practicable, drills or reamers shall be directed by mechanical means. Drilling or reaming shall be done with twist drills.

Burrs on outside surfaces shall be removed. If required by the Engineer, assembled parts shall be taken apart for the removal of burrs.

Poor matching of holes is cause for rejection.

(3) Subsized Holes
When subpunching or subdrilling is required, the holes shall first be punched or drilled 3/16 inch smaller than full size and then reamed to full size.

(4) Templates
Templates shall be fabricated from steel and shall have hardened steel bushings in holes located in accordance with the required geometry. Template thickness shall be substantial enough to eliminate template buckling and consequent misalignment during hole fabrication, but not less than 1/2 inch. Bushings shall be long enough to accurately guide the drill bits during hole fabrication, but not less than 1 inch.

Template holes shall be located from the center lines of the connections as inscribed on the templates. The center lines shall be used in accurately locating the templates from the milled or scribed ends of the members. Templates used for reaming matching members or the opposite faces of a single member shall be exact duplicates.

Before drilling (reaming) is begun, the templates shall be accurately located as to position and angle and firmly bolted in place. Templates used for reaming connections on like members shall be so accurately located that the resulting fabricated members are exact duplicates and require no matchmarking.

(5) Numerically Controlled (N/C) Drilling
For any connection designated in Items 1.a.(2)(a), 1.a.(2)(b) or 1.a.(2)(c), above, the Contractor shall have the option to drill holes to full size in unassembled connections, including templates for use with matching

subsized and reamed holes, by means of suitable N/C drilling equipment in lieu of subpunching or subdrilling and subsequent reaming to full size or drilling to full size while assembled. Holes drilled using N/C drilling equipment shall be drilled to appropriate size either through individual pieces or any combination of pieces held tightly together.

If N/C drilling equipment is used, the Engineer, unless otherwise stated in the special provisions or in the plans, may require the Contractor, by means of check assemblies, to demonstrate that his drilling procedure consistently produces holes and connections meeting the requirements of Items 1.c.(2) and 2., below.

If required by the Engineer, the Contractor shall submit for approval a detailed outline (from initial drilling through the check of the shop assembly) of the procedure that he proposes to follow in accomplishing the work. The outline shall include reference to specific members of the structure that are proposed for N/C drilling, the sizes of the holes, the locations of common indexes and other reference points, the composition of check assemblies and all other pertinent information. Drilling shall not begin until the Contractor receives written approval from the Engineer.

c. Accuracy of Holes

(1) Punched, Subpunched and Subdrilled Holes
Holes punched full size, subpunched or subdrilled shall be so accurately made that after assembling (before any reaming is done) a cylindrical pin 1/8 inch smaller in diameter than the nominal size of the holes may be entered perpendicular to the face of the member, without drifting, in at least 75 percent of the holes in each plane of each connection. If this requirement is not fulfilled, the faulty pieces will be rejected. If any hole will not pass a pin 3/16 inch smaller in diameter than the nominal size of the hole, it will be rejected.

(2) Drilled (Reamed) Holes
When holes are drilled (reamed) to full size, 85 percent of the holes in any connection shall, after reaming or drilling, show no offset greater than 1/32 inch between adjacent thicknesses of metal. If this requirement is not fulfilled, the faulty pieces will be rejected.

2. Shop Assembly

a. Bolted Subassemblies
Subassemblies such as crossframes, stringers, lateral systems etc. with bolted connections shall be completely assembled and made ready for erection before shipping. The assemblies shall be free from twists, bends and other deformations.

Just before final bolting, contact surfaces, including those adjacent to the bolt heads, nuts and washers, shall be cleaned by sandblasting. Sandblasting shall be done in accordance with Item 2.d.(2), below.

b. Method of Shop Assembly
Shop assembly shall proceed in accordance with one of the assembly techniques listed in Items 2.b.(1) through 2.b.(5), below. The assembly technique shall be compatible with the method of erection to be used by the Contractor. The assembly technique and the method of erection shall be submitted to the Engineer for approval.

Bolted connections shall be drift pinned to prevent lateral movement and securely bolted to draw parts into contact. At least 25 percent of the holes shall be bolted (the Engineer may require as many as 50 percent). Girder sections shall be properly set to camber and alignment and the ends of compression members shall be in full bearing.

The drifting done during assembling shall be only such as to bring the parts into position and not sufficient to enlarge the holes or distort the metal.

For the purpose of shop assembly, the following definitions shall apply:

Truss: A truss is considered to be one-half of a superstructure and consists of a top and

bottom chord and all members connecting the top and bottom chords. Members connecting trusses such as floor beams, lateral systems etc. are not included.

Girder Cross-Section: A girder cross-section for a plate girder superstructure consists of one top flange, one web and one bottom flange, including all stiffeners etc. associated with these flanges and webs. A girder cross-section for a box girder superstructure consists of all top flanges, all webs and one bottom flange associated with one boxed-in section, including the crossframes, laterals, stiffeners etc. encompassed within these flanges and webs.

Shop Section: A shop section consists of a girder cross-section running full length between points of discontinuity (including field splices but not welded shop splices) within the length of a superstructure.

Panel: A panel consists of a length of truss running full length between points where vertical, diagonal and other bracing members are connected to the chords.

Chord Length: A chord length consists of a length of chord running full length between points of discontinuity (including field splices but not welded shop splices) within the length of a superstructure.

(1) Full Truss or Girder Assembly
Full truss or girder assembly consists of assembling each truss or girder cross-section full length between expansion joints.

(2) Progressive Truss or Girder Assembly
Progressive truss or girder assembly consists of assembling each truss or girder cross-section, full length of the superstructure, in stages.

The initial stage shall be as follows:

(a) Truss
The initial stage shall consist of at least three adjacent panels but not less than the number of panels associated with

three adjacent chord lengths, and not less than 150 feet for structures longer than 150 feet.

(b) Girder Cross-Section
The initial stage shall consist of at least three adjacent shop sections, and not less than 150 feet for structures longer than 150 feet.

After the initial stage is completed, subsequent stages shall be assembled which consist of not less than two panels or shop sections of the previous stage, repositioned if necessary and adequately pinned to assure accurate alignment, plus one or more panels (or as many panels as are associated with a chord length) or shop sections added at the advancing end. In the case of structures longer than 150 feet, each stage shall be not less than 150 feet long regardless of the length of individual continuous panels or shop sections.

Sequence of assembly may start from any location in the structure and proceed in one or both directions so long as the preceding requirements are satisfied.

Assemblies consisting of less than three panels or shop sections shall require approval of the Engineer.

(3) Full Chord Assembly
Full Chord Assembly consists of assembling, with geometric angles at the joints, the full length of each chord of each truss and then reaming the field connection holes while the members are assembled. The web member connections shall be reamed to templates set at geometric (not cambered) angular relation to the chord lines. Field connection holes in web members shall be reamed to templates.

At least one end of each web member shall be milled or scribed normal to the longitudinal axis of the member. The templates at both ends of each member shall be accurately located from one of the milled ends or scribed lines.

(4) Progressive Chord Assembly
Progressive chord assembly consists of assembling adjacent chord lengths in the manner specified for Full Chord Assembly (Item 2.b.(3), above) and with the assembly technique specified for Progressive Truss or Girder Assembly (Item 2.b.(2), above).

(5) Special Complete Structure Assembly
Special complete structure assembly consists of assembling the entire structure (all structural steel portions - superstructure and substructure), including all secondary members, at one time.

c. Check of Shop Assembly
Each assembly and stage of assembly of the assembly technique proposed by the Contractor and approved by the Engineer, shall be checked for alignment, accuracy of holes, fit of milled joints etc. and shall be approved by the Engineer before drilling (reaming) is commenced or, if N/C drilling has been used, before the assembly or stage of assembly is dismantled.

If an assembly or stage of assembly is not approved by the Engineer, deficiencies shall be corrected and the assembly or stage of assembly shall be resubmitted for approval by the Engineer.

Before drilling (reaming) is commenced or, if N/C drilling has been used, before the assembly or stage of assembly is dismantled, approval must be given to the Contractor in writing by the Engineer.

d. Surface Preparation

(1) Painting
All structural low alloy steel surfaces, except the top surfaces of the top flanges, the interior surfaces of the steel box girders, and other surfaces embedded in concrete shall be painted with an inorganic zinc vinyl paint system as outlined in these special provisions under the heading, PAINTING SUPERSTRUCTURE STEEL SPANS.

(2) Cleaning
After fabrication and before shipping, all structural steel, except contact surfaces of

shop bolted connections, shall be cleaned by sandblasting. Contact surfaces of shop bolted connections shall have been previously sandblasted.

Sandblasting shall be done in accordance with the latest edition of the SSPC Specifications for near-white blast cleaning (SSPC-SP 10). The use of acids for the removal of scale and stains is not permitted.

Erection

1. Field Bolted Connections
Just before final bolting, contact surfaces, including those adjacent to the bolt heads, nuts and washers, shall be cleaned by sandblasting. Sandblasting shall be done in accordance with the latest edition of the SSPC Specifications for commercial blast cleaning (SSPC-SP 6-63).

2. Surface Condition
During erection of the structure, care shall be taken to keep steel surfaces clean and free from dirt, concrete, mortar, oil, paint, grease or other foreign material that will produce staining. Surfaces that become stained shall be cleaned as follows:

a. Unpainted Steel Surfaces
Unpainted steel surfaces shall be cleaned by sandblasting. If surfaces visible to the public become stained, they shall be sandblasted to such extent, as determined by the Engineer, that the uniform weathering aesthetics of the structure are preserved.

Sand blast cleaning shall be done in accordance with the subsection entitled Fabrication, Item 2.d.(2), by the Contractor and at the Contractor's expense.

b. Painted Steel Surfaces
Painted steel surfaces shall be cleaned by appropriate methods as required by the type of staining. The method shall be approved by the Engineer. All cleaning shall be done by the Contractor at the Contractor's expense.

Quantities

This item of work contains approximately the following quantities of materials:

Structural Low Alloy Steel (ASTM A 588) (Includes permanent metal forms, hardware and accessories)	2,530,000	Pounds
Structural Carbon Steel (A 36) (Includes bearings and plates)	92,000	Pounds
Bearing Pads 1/2" x 8" x 20"	20	Only
Bearing Pads 2" x 8" x 20"	120	Only
Grout Pads	140	Only

The quantities are listed only for the convenience of the Contractor in determining the volume of work involved and are not guaranteed to be accurate. The prospective bidders shall verify these quantities before submitting a bid. No adjustments other than for approved changes will be made in the lump sum contract price for this item of work, even though the actual quantities required may deviate from that listed.

Payment

The lump sum contract price for "Superstructure Steel Span" shall be full compensation for all materials, costs in connection with furnishing all labor, tools and equipment for the manufacture, fabrication, transportation, erection, painting and all other items necessary to construct and complete the superstructure steel spans in accordance with the plans, the standard specifications and these special provisions.

PAINTING SUPERSTRUCTURE STEEL SPANS
(November 2, 1981)

All exposed structural steel surfaces of the superstructure, including bearings, shall be painted with an Inorganic Zinc Vinyl Paint system.

After fabrication of the steel box has been completed and immediately before the first or shop coat of paint is applied all structural steel surfaces shall be thoroughly cleaned by sandblasting as required by section 9-06.35 of the standard specifications.

Paint thinner shall be used to remove all oily residue left from drilling and fitting up, followed by sandblast on these areas to ensure complete removal of all surface residue.

After being thoroughly cleaned by sandblasting as specified above, the structural steel surfaces shall be painted within the same working day on which sandblasting takes place, and before any rust forms, by spraying with a full coat of Inorganic Zinc Silicate Paint. The dry

film thickness shall be a minimum of 2.5 mils. High strength field bolts need not be painted before erection.

Contact surfaces of bolted joints shall be painted with only the shop coat of the Inorganic Zinc Silicate Paint.

All exposed surfaces shall in addition be painted with one full coat of Vinyl Wash Primer, or the alternate tie coat, and two full coats of Vinyl Finish Coat. Surfaces which are inaccessible for painting after erection shall be painted the three field coats of paint before erection. Exposed surfaces of high strength field bolts shall receive one full coat of paint as specified for shop painting after erection and before the remaining two field coats of paint are applied.

After erection, all damaged areas shall be repaired by sandblasting to remove rust and spotted with a field coat of Inorganic Zinc Silicate Paint. After the spot coat has cured, surface dirt shall be removed by means of flushing or suitable solvents and the surface permitted to dry. Open cracks and crevices shall be caulked with a caulking compound compatible with inorganic zinc paint.

A full field coat of Vinyl Wash Primer shall be spray applied to all surfaces to yield a dry film thickness of 0.5 to 0.9 mils. An alternate tie coat as recommended by the supplier of the inorganic zinc paint may be substituted for the wash primer and applied at the film thickness recommended by the supplier. After not less than 60 minutes drying time, two full field coats of Vinyl Gray Finish shall be spray applied to all surfaces. The first field coat shall be tinted with Black Vinyl Tinting Paste to give a slight color difference between coats. Not less than four hours drying time will be required between finish coats. The minimum dry film thickness per finish field coat shall be 1.4 mils.

The minimum total dry film thickness for the system shall be 5.8 mils. The total film thickness, of vinyl paint, must be met by the specified number of coats or more. Heavy build up of one coat will not be acceptable.

Inorganic Zinc Silicate Paint

The shop coat of Inorganic Zinc Silicate Paint shall conform to the following specification:

Description

The inorganic zinc silicate coating shall be a solvent system of the selfcure type. Due to uncertainty of application conditions caused by humidity and temperature and the accompanying problems in application and curing, water-borne inorganic zinc silicate systems will not be permitted. It shall be approved on the current list of approved inorganic zinc silicate coatings, MIL-P-23236 Type 1 Class 3.

Acceptance of the material will be made on presentation of proof by the supplier that his product, listing brand names and product number or name, appears on the current list at the time of use. All inorganic zinc silicate paint required for this project shall be the product from one manufacturer.

Application
The coating shall be capable of being applied in accordance with specification requirements by brush or spray.

As a part of this specification and a condition of use of the inorganic zinc silicate coating, the supplier of the coating shall furnish the services of a technically qualified liaison man acceptable to the Engineer and the manufacturer of the coating. He shall recommend the procedures and conditions of application to the coating applicator and satisfy himself as to the efficiency of the operation so that he can certify in writing in the name of the coating manufacturer that the system has been applied and cured satisfactorily. Failure of the Contractor to present this certificate shall be reason for rejection of that portion of the work not covered by such certification.

Stirring paddles on mechanical mixers shall reach to within one inch of the bottom of the stirring container during mechanical mixing.

Conditions for coating application shall be a minimum temperature of 40 degrees F and a maximum relative humidity of 75 percent.

Spray equipment for application of Inorganic Zinc Silicate Paint shall be as recommended by the supplier of the paint.

The minimum dry and cured film thickness for the inorganic zinc silicate coating used as a prime coat under top coats shall be 2.5 mils. This film thickness shall be achieved in one or more coats as directed by the supplier.

When top coats are specified over the inorganic zinc paint, a tie coat shall be applied. The tie coat shall be Vinyl Wash Primer, meeting Federal Specification MIL-P-15328B, Coating, Pretreatment, applied at a film thickness of 0.5 - 0.9 mils to the cured inorganic zinc paint film. As an alternate, the tie coat furnished by the supplier of the inorganic zinc coating may be applied at such film thickness as he recommends.

Packaging and Labeling
The paint shall be packaged so that one unit of the pigment can be mixed with the vehicle in its container. The containers must be coated if necessary to prevent attack by the paint.

Each container shall be marked in large type with a warning against resealing any container after the paint is mixed. Complete instructions for use shall be included with each container.

Patents
The Contractor shall assume all costs arising from the use of patented materials, equipment, devices, or processes used on or incorporated in the work, and agrees to indemnify and save harmless the State of Washington, and their duly authorized representative from all suits at law or action of every nature for, or on account of the use of any patented materials, equipment, devices, or processes.

Vinyl Wash Primer
Vinyl Wash Primer shall meet Federal Specification MIL-P-15328B Coating, Pretreatment (Formula 117) (State Standard Formula A-5-61).

Vinyl Wash Primer shall be mixed by adding one volume of acid component (diluent) to four volumes of resin component (base solution) slowly and with constant stirring. The material must be used within eight hours of mixing. The wash primer coat shall be spray applied to all surfaces at a coverage rate of 250 to 300 square feet per gallon to yield a dry film of 0.5 to 0.9 mils thickness. If necessary to maintain a wet spray, additional thinning with normal Butanol (1) or 99 percent Isopropanol (2) will be allowed. Acid component above the required amount shall not be used for thinning. A drying time of one hour is required before recoating.

(1) Butanol shall meet Federal Specification TT-B-846b Butyl Alcohol; Normal.

(2) Isopropanol (99 percent) shall conform to ASTM Designation D 770-46 Isopropyl Alcohol.

Vinyl Finish Coat
Vinyl Finish Coat shall conform to the following specification:

Pigment (12 percent Minimum by Weight)
A combination of titanium dioxide and colored pigments or a combination of colored pigments such that the resultant paint when dry matches the color of the color sample available at the Project Engineer's office.

Vehicle (88 percent Maximum by Weight)

Vinyl Resin Type II (3)	9.1%
Vinyl Resin Type III (4)	9.1%
Tricresyl Phosphate	3.4%
Methyl Isobutyl Ketone	39.2%
Toluene	39.2%
	100.0%

(3) Vinyl Resin Type II shall be hydroxyl containing vinyl chloride-acetate copolymer. It shall contain 89.5 to 91.5 percent (by weight) vinyl chloride, 2.0 to 5.5 percent vinyl acetate and 5.3 to 7.0 percent vinyl alcohol. It shall produce results in the specified formulations equal to the Bakelite Corporation Vinylite resin VAGH.

(4) Vinyl Resin Type III shall be a vinyl chloride-acetate copolymer of medium average molecular weight and shall contain 85 to 88 percent vinyl chloride and 12 to 15 percent vinyl acetate by weight. It shall produce in the specified formulations results equal to Bakelite Corporation Vinylite resin VYHH.

Lampblack shall be ground in the Vinyl Finish Coat vehicle to yield a smooth well ground paint, Black Vinyl Tinting Paste, satisfactory for tinting either the Vinyl Wash Primer or Vinyl Finish Coat.

The Vinyl Finish Coat and Vinyl Tinting Paste shall be ground to a fineness of not less than 5 (TT-P-141 b - 441.1).

Vinyl Thinner shall be composed of the following raw materials:

Toluene	90% by volume
Methyl Isobutyl Ketone	10% by volume

Vinyl Finish Coat shall be spray applied. The paints as received will require thinning with from 20 to 35 percent by volume of Vinyl Thinner to maintain a wet spray.

No other thinners shall be used. Each coat, exclusive of the wash coat, called for on the schedule shall consist of a double spray coat, applied at a coverage rate of approximately 150 square feet per gallon, but, in any event, sufficient to yield a minimum dry film thickness of 1.4 mils. A double spray coat shall consist of giving an area, approximately 30 to 40 square feet, a thin coat of paint in one pass followed in a few minutes by a heavy coat applied just short of sagging to build up the film thickness. Care shall be taken that the spray nozzle is held at right angles to the surface and close enough to deposit a wet spray at all times.

Since the flow characteristics of these materials are poor, care must be taken to completely coat all edges, cracks, crevices, rivets and other surface irregularities. Fluid and atomizing pressures shall be maintained as low as possible to avoid overspray and solvent losses. Succeeding passes of the spray shall be at right angles to the previous one. Finish coats shall dry at least four hours before recoating.

The spray equipment shall be in good condition and capable of handling the specified materials. The equipment shall include all agitators, pressure gauges, and pressure regulators necessary to properly control application of the coatings.

Care shall be exercised during spraying to hold the nozzle perpendicular to and not more than 10 inches from the surfaces being painted to deposit a wet film on that surface and avoid excessive loss of solvents and bridging of cracks and crevices.

All costs in connection with furnishing and placing all necessary staging and rigging, providing all material, labor, tools and equipment, performing all cleaning and preparation of surfaces to be painted and applying all coats of paint and sealing paste, all in accordance with the standard specifications and these special provisions shall be incidental to and included in the lump sum contract price for "Superstructure Steel Span".

PAINTING MISCELLANEOUS ITEMS

All structural carbon steel, cast steel, hydraulic jacks and the jacking devices and temporary cross frames and superstructure bearings and miscellaneous exposed metal parts, except galvanized steel items, that are shown in the plans shall be painted with one shop coat of red primer paint State Standard Formula No. A-4-59. All metal surfaces with the shop coat, except the anchor lifting bars and the structural

steel anchor fastenings, which are not embedded in concrete, shall in addition be painted with one field coat of brown paint State Standard Formula No. B-4-59 and one final field coat of gray paint State Standard Formula No. C-9-71. Pigmentation for State Standard Formula No. C-9-71 shall be adjusted to match the surrounding concrete.

The portions of the anchor lifting bars and structural steel anchor fastenings which are to be embedded in concrete shall not be painted. All exposed portions of the anchor lifting bars shall be given one coat of Phenolic Red lead paint, Formula No. A-4-59 and one coat of B-4-59. Film thickness shall be 3 mils minimum. All exposed portions of the structural steel fastenings at the anchors, all portions of the anchor eyebars, the upper parts of the structural steel anchor piles down to a point which will finally be 2 to 3 feet below the ground surface together with the bolster castings, links and turnbuckles and the strand socket at the anchor end of the anchor line shall be painted before being placed in the water with two coats of coal-tar epoxy resin paint conforming to U.S. Navy Specifications MIL-P-23236 Type 1, Class 2. This shall be applied in accordance with the manufacturer's recommendation. The total final thickness of the coating shall be 14 to 16 mils. Care shall be exercised in handling and placing these members not to damage the coating. The threaded portions of the links and the pins shall be coated with a Texaco Geartac or equivalent heavy adherent grease as manufactured by Chevron or an approved equal.

All exposed surfaces of the structural steel shear key frames and recess frames at the joint between the pontoons, exposed heads, nuts and threads of the 2-1/4 inch diameter high strength bolts, anchor bearing plates and the 1/2 inch vertical plates at the pontoon bolted joints shall be painted one coat of red primer paint State Standard Formula No. A-7-70 and two coats of Rustoleum Texaco Rust Proofing Compound, Type LB or an approved equal in lieu of the two coats stated earlier in this provision.

All coats of paint shall each have a minimum wet film thickness of 3 mils. The Contractor may, if he elects, apply the shop coat of paint with approved spray equipment, providing the paint is completely brushed out with brushes immediately after application.

All field coats of paint shall be brush applied and the use of spray machines in the field will not be allowed.

Cleaning and painting of structural steel and cast steel shall conform to the requirements of section 6-07 of the standard specifications. In addition, before the field coats of paint are applied, any salt contamination must be removed from the surfaces by washing or steaming with salt free water.

The marine plywood cable port covers shall be treated with a resin sealer approved by the Engineer prior to its use.

All costs in connection with cleaning and painting the metal surfaces as specified shall be incidental to and included in the unit contract prices or lump sum contract prices for the various materials to be painted.

BRIDGE MINOR ITEMS
(November 2, 1981)

For the purpose of payment, such bridge items as *** cable port cover, rubber gaskets, epoxy, closed cell neoprene,*** etc., for which there is no pay item included in the proposal, are considered as bridge minor items. All costs in connection with furnishing and installing these bridge minor items as shown and noted in the plans and as outlined in these specifications and in the standard specifications shall be included in the *** unit contract price per each of the pontoons as listed under item 5-01, payment of the provision titled CONCRETE PONTOONS. ***

ROADWAY SLAB

This item of work shall include all reinforced concrete portions of the structure supported on the *** steel box except the traffic barriers and the pedestrian railing.

The roadway slab contains approximately the following quantities of materials:

Steel Reinforcing Bar	229,000	Pounds
Epoxy-Coated Steel Reinforcing Bars	289,700	Pounds
Concrete Class AX	2,360	Cubic Yards

The quantities are listed for the convenience of the Contractor in determining the volume of work involved and are not guaranteed to be accurate. The prospective bidders shall verify these quantities before submitting a bid. No adjustments other than for approved changes will be made in the lump sum contract price for "Roadway Slab" even though the actual quantities required may deviate from those listed.

The lump sum contract price for "Roadway Slab" shall be full compensation for all materials, labor, equipment and tools necessary to complete all portions of the structure covered by this item in accordance with the attached plans, the standard specifications and these special provisions.

FALSEWORK AND FORMS - SUPERSTRUCTURE STEEL SPANS

Section 6-02.3(17) of the standard specifications is supplemented as follows:

All wood forms for the roadway slab shall be removed. Forms for exterior soffits and between box girders shall be removed.

Permanent metal forms shall be used for that portion of the concrete slab inside the box girders. Permanent metal forms shall conform to the following requirements:

Metal shall be 22 gage minimum thickness, with 2 inch depth and 6 inch pitch, zinc coated, steel sheet conforming to ASTM A 446, Grade E, with a coating class of G 165 in accordance with ASTM A 525. All accessories shall be of structural quality steel with a zinc coating of 2.0 ounces per square foot.

Forms shall be designed by the Contractor to support the plastic concrete, metal forms, reinforcing steel, and a construction live load of 50 pounds per square foot. Deflection shall not exceed 1/180 of the span. Camber shall not exceed the anticipated deflection. The working unit stress shall not exceed 0.725 of the specified yield strength of the material furnished.

The depth of concrete plus permanent metal form shall be 8 1/2 inches minimum. Bottom transverse reinforcing steel of the roadway slab shall be at least 1 inch clear of the metal forms at all points. Forms or supports shall not be welded to girder flanges.

The deck slab shall be placed continuously between transverse construction joints shown in the plans. If, because of an emergency, a transverse joint is allowed by the Engineer, it shall occur at the bottom of a flute and 1/4 inch weep holes shall be field drilled at 12 inch centers along the line of the joint.

Any zinc coating on exposed form metal damaged during construction shall be repaired in accordance with section 9-08.2 of the standard specifications, Formula A-9-73.

Should the Engineer determine that inspection of the underside of the hardened slab is warranted, the Contractor shall remove at least one section of metal form in each span at no extra cost to the State. If excessive honeycomb or other defects are found the Contractor shall, if required by the Engineer, remove additional form sections at his own expense and shall revise his concrete placing methods as required to produce sound concrete. All unacceptable concrete shall be removed or repaired as directed by the Engineer.

The Contractor shall submit working drawings to the Engineer for approval of permanent metal forms, complete with layout, details, and description of materials in accordance with the standard specifications.

No direct payment will be made for permanent metal forms and the cost thereof shall be included in the lump sum contract price for "Superstructure Steel Span".

BARRIER
(February 8, 1982)

This item of work includes the construction of the *** traffic barrier and the median traffic barrier spans 1W thru 7W***. The reinforcing bars that extend from the *** pontoon roadways and roadway slabs*** are not included.

Measurement will be by the linear foot along the line and slope of the completed barrier.

The unit contract price per linear foot for "Barrier" shall be full compensation for all material, labor, tools and equipment necessary to complete the work described herein in accordance with the contract documents.

PEDESTRIAN RAILING

This item of work shall consist of furnishing and installing the metal railing as shown and noted in the plans. It shall also include the anchor bolts embedded in concrete, shims, post brackets and other appurtenances that are required to manufacture and install all the pedestrian railing complete in place.

Before fabricating the railing components, the Contractor shall submit 6 copies of the fabrication plans to the Engineer for approval. Approval of shop plans shall be as specified in section 9-06.27 of the standard specifications.

Other approved rail connection details may be substituted for those shown in the plans, provided the Contractor indicates such proposed details in the shop plans submitted to the Engineer for approval.

Measurement will be by the linear foot made along the line and slope of the base of the completed metal railing.

The unit contract price per linear foot for "Pedestrain Railing" shall be full compensation for all materials, labor, tools and equipment necessary to construct and install the railings as shown in the plans and as outlined in these special provisions.

ELECTRICAL CONDUIT

The Contractor shall furnish and install galvanized steel conduit for future electrical installation in the bariers and roadway slab in the location and as shown in the plans.

The one inch diameter conduit for the traffic detection system in the roadway pontoons is included in this item of pay.

All costs in connection with furnishing and installing the electrical conduits and appurtenances including the traffic detection system as shown and noted in the plans and as outlined herein shall be included in the lump sum contract price for "Electrical Conduit", which price will be full compensation for all costs in connection with furnishing and installing the 2, 1-1/2, 1-1/4 and 1 inch diameter conduits, and the junction boxes as shown and noted in the plans.

BOATER PROTECTION SYSTEM

This item of work shall consist of furnising, transporting and installing the boater protection system including buoys, cables, cable anchorage for connections and other items as shown and noted in the plans for this project.

The Contractor shall transport the boater protection system and all accessories as described above and as packaged and stored at District 1 Maintenance Yard, 10833 Northrup Way, Bellevue, Washington to the Stage 2 construction site.

After all cables and buoys in phase 2 are installed, the cables shall receive a final adjustment. They shall be adjusted to a tension which will place all buoys in the location shown in the plans. This adjustment shall be performed under still water conditions.

All costs in connection with furnishing, transporting and installing the boater protection system as shown and noted in the plans and as outlined herein shall be included in the lump sum contract price for "Boater Protection System", which price shall be full compensation for all material, labor, equipment and other items as may be required by the U.S. Coast Guard or the Engineer to install the system for this project.

NAVIGATION LIGHTING SYSTEM

The Contractor shall furnish and install navigation lights on the north side of each pontoon as indicated in the plans.

Power for the navigation lighting system shall be obtained by continuing the circuits placed along the north side of pontoons F through O by the Phase I Contractor. As additional pontoons are anchored in place, the Contractor shall extend the power circuit to